Title **Gocator Gap and Flush Measurement Tool Setup Guidelines**

Purpose

This document explains how to setup the Gocator's gap and flush measurement tools.

Equipment

Gocator Firmware Release 3.3 or later

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1 Overview

This document provides guidelines on how to set up the gap and flush measurements in the Gocator.

This document assumes readers are already familiar with the gap and flush model and algorithm described in the Gocator user manual. Key concepts explained in the user manual are formatted in *italics* and setting names are in **Bold**.

2 Setup Guidelines

2.1 Ambient

The algorithm filters out ambient by rejecting outliers when fitting the surface line or circle fit. However measurements are most repeatable when there are no spots caused by ambient.

User can use the sensor's active area or measurement area to mask out unintended objects or reflections. Refer to the Gocator user manual on how to set the sensor's active area and measurement area.

2.2 Laser Reflection

User must mount the sensor such that the laser is not directly reflected back into the camera window. Direct laser reflection could severely affect the measurement accuracy.

The following diagram illustrates a setup that exhibits this problem.

Figure 1. Direct Laser Reflection into the Camera

2.3 Sharp Edge

To locate a sharp edge, set the nominal radius to 0 and use the ***Minimum Depth*** to define the minimum depth for the edge.

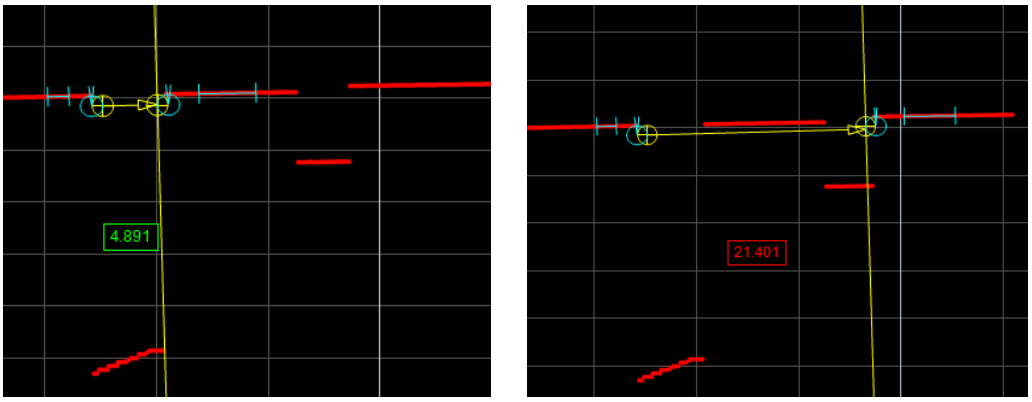

Figure 2. Correct Edge Detected with Minimum Depth Set to 10mm (left) and 0mm (right)

The **Edge Angle** should be set to 90 degrees for a sharp vertical edge. If a sharp edge has a slope, the angle should be set to the slope of the edge.

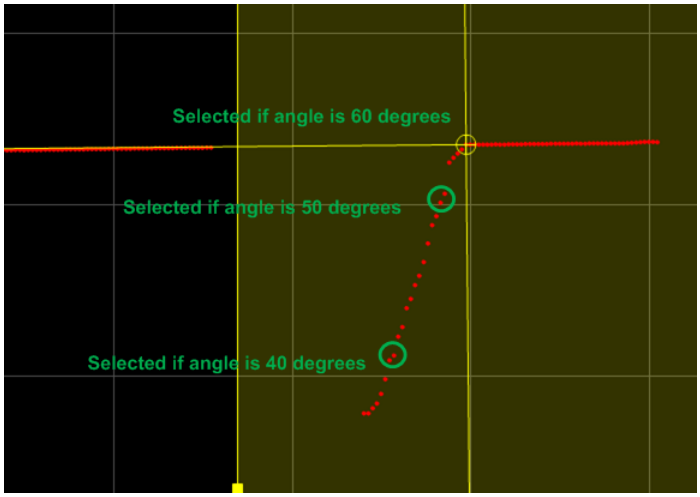

Figure 3. Effect of Edge Angle on Sharp Edge (with Slope) Location

2.4 Curved Surface

When the *surface region* is curved, the **Surface Offset** and **Surface Width** should be set such that the surface region is as close to the edge as possible.

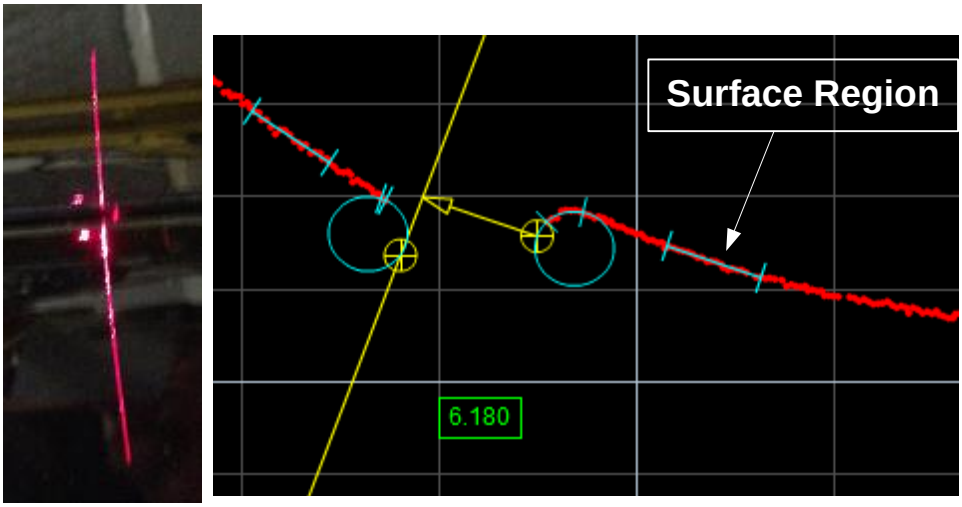

Figure 4. Curved Surface's Surface Region Setup

2.5 Stabilize Flush Measurement

Surface Width of the reference region has a strong influence on the stability of the flush measurement. This is because flush measures the perpendicular distance from the reference side's fitted *surface line* to the feature point on the secondary surface. A slight angle change in the reference side's fitted *surface line* would have an amplified effect on the measured distance. This is illustrated below:

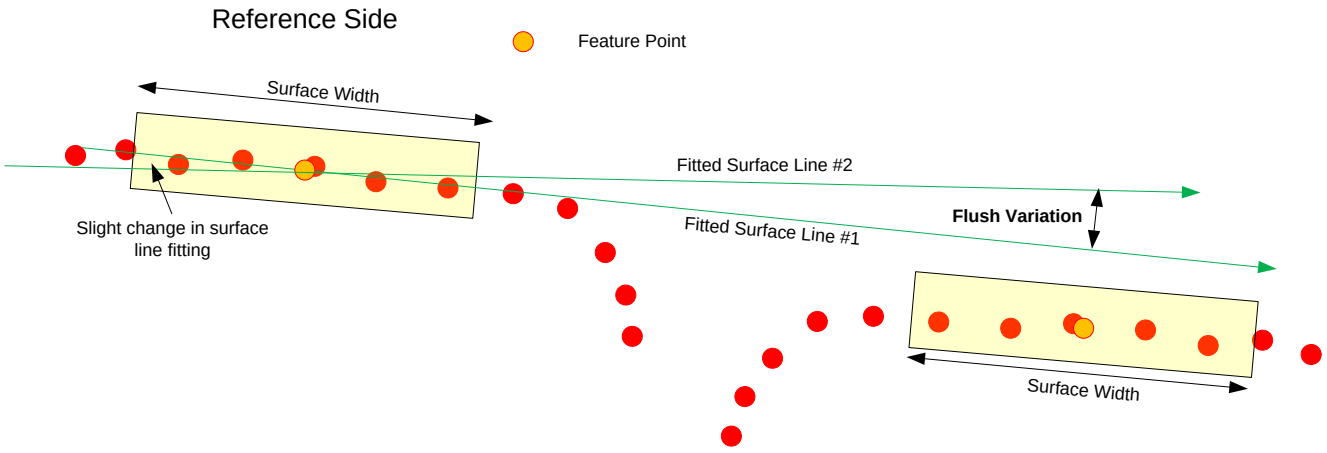

Figure 5. Effects of Surface line fitting on Flush Measurement

To increase the stability of the flush measurement, the surface width on the reference side should be as large as possible.

2.6 Multiple Gap-like Feature within the Active Area

This could occur when the laser line spans multiple gaps within its field of view. A typical example is when the laser covers the car body and the chrome frame around the window.

Figure 6. Example of when Multiple Gaps Exists within the Field of View

User should use set the active area or the measurement region such that only the target gap is within the field of view When this is not possible, use the **Maximum Gap Width** to filter out the undesired gap. This is only applicable to when the target gap is *narrower* than the other gaps.

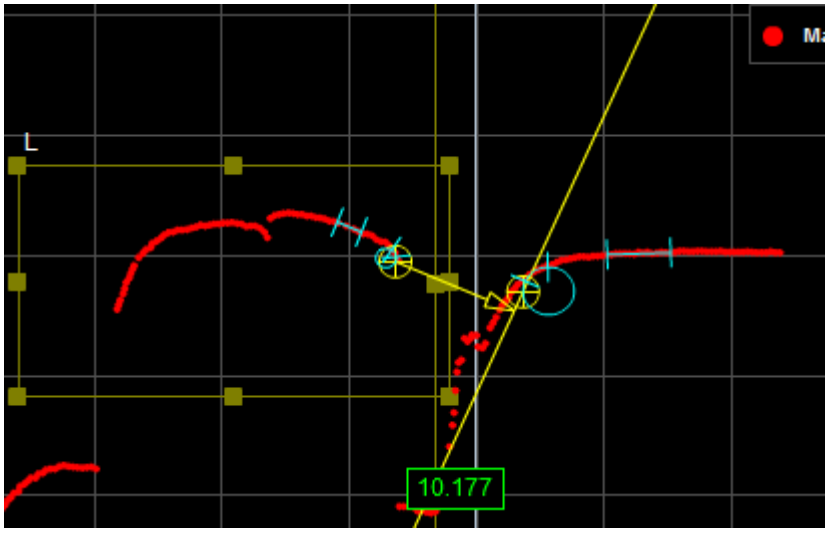

Figure 7. Corrected Edge Selected with Max Gap Width Set to 12mm

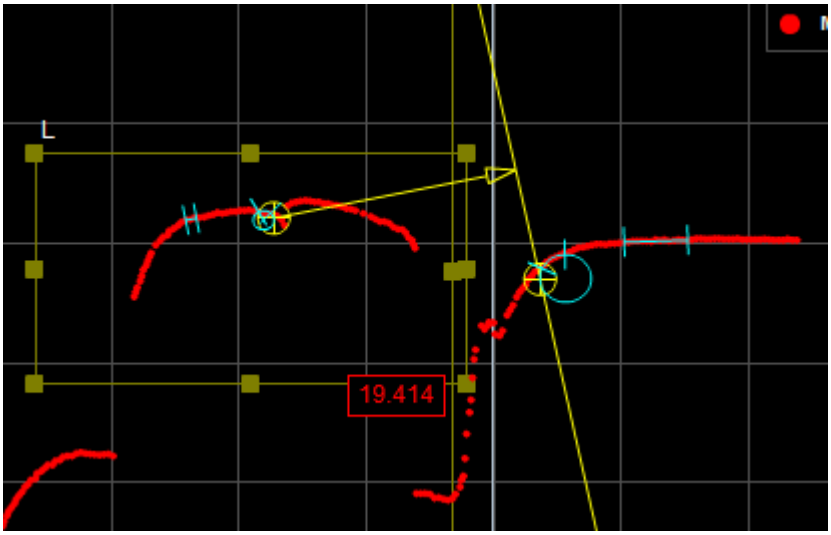

Figure 8. Incorrect Edge Picked up With Maximum Gap Width Set o 0

2.7 Paint Flakes and Plastic Surface

Paint flakes or very rough surface could significantly affect reflection characteristics along the laser line. This causes “bump” and “dips” to appear along the laser line.

Figure 9. Irregular Reflection Caused by Paint Flakes (Left) or Rough Plastic Surface (Right)

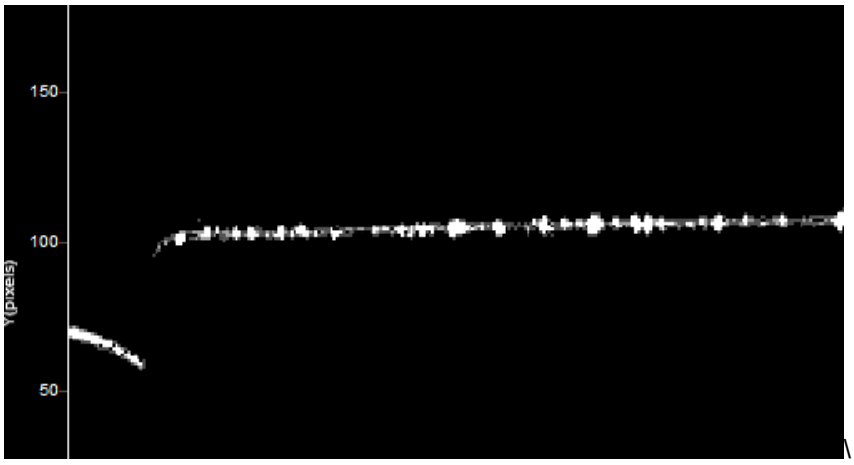

Figure 10. Effects of Paint Flakes on the Laser Line Reflection

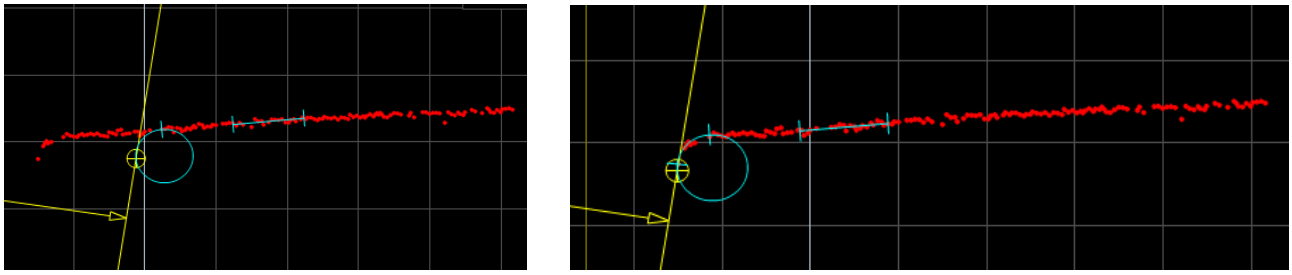

Figure 11. Edge with Void Width Max set to 0mm (left) and 5mm (right)